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**HISTORICAL NOTES ON COLLECTIONS AND
TAXONOMY OF *PENSTEMON HAYDENII* S. WATS.
(BLOWOUT PENSTEMON),
NEBRASKA'S ONLY ENDEMIC PLANT SPECIES**

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Penstemon haydenii was originally described in 1891 by Sereno Watson and was named for its first collector, the geologist and explorer Ferdinand V. Hayden, who probably collected it in the late summer of 1857 in the "Sand Hills of Loup Fork," Nebraska. The Hayden specimen which Watson saw in the Gray Herbarium at Harvard University had evidently been labeled with an incorrect location. Watson did not base his description on that early specimen but upon a more complete specimen, also in the Gray Herbarium, taken by Herbert J. Webber in Thomas County in 1891; so the Webber specimen, not the earlier Hayden collection, was designated by Francis W. Pennell as the type specimen. Between the original Hayden collection and 1968, only about eight collectors had taken the plant, and knowledge of it was very limited. I collected it with Robert Kaul and Dennis Brown in 1968, but I was not aware of its extremely limited distribution until about 1974, when work began on checklists for the Great Plains Flora project.

† † †

INTRODUCTION

Penstemon haydenii S. Wats., blowout penstemon (Fig. 1), is the only Nebraska endemic flowering plant, and it has recently been listed as an endangered species by the Fish and Wildlife Service (1987). It is found only in active areas of wind erosion (blowouts) in the Sand Hills region of Nebraska (Fig. 2), but it is by no means in every blowout. In fact, after rather extensive searches and after following up on many suggestions from Sand Hills residents, Stubbendieck, Weedon, Traeger, and Lindgren (1982) were able to locate only eight populations. At present, *P. haydenii* is known to consist of perhaps two thousand plants at scattered locations in Box Butte, Cherry, Garden, Hooker, Morrill, and Sheridan counties (Fish and Wildlife Service, 1987). A number of old collections also exist from Thomas County, although the plant has not been seen there recently. Because of the rarity of the plant and the inadequacy of labeling on many of the existing specimens, there has been considerable confusion about its distribution and doubt about the correct botanical typification.



FIGURE 1. Sketch of a flowering stem of *Penstemon haydenii* made from a photograph.

EARLIEST COLLECTION

Penstemon haydenii was first collected by the geologist and explorer Ferdinand V. Hayden (Fig. 3), the leader of the "Hayden Surveys" of the western United States. A likely time for this collection appears to have been early in his career when he made two expeditions under Lieutenant Gouverneur K. Warren, of the United States Topographical Engineers (White, 1895). The second of these expeditions took him, in late July and early August, 1857, along the North Loup River, through the Sand Hills area that is the home of *P. haydenii* (Hayden, 1862). A single plant list (excluding the Cyperaceae) covering the collections of both Warren expeditions was prepared by the St. Louis botanist George Engelmann (*in* Hayden, 1862, pp. 102–209) probably in consultation with Asa Gray of Harvard University, his close friend and botanical colleague (White, 1902). A specimen from the 1857 (?) expedition now in the Gray Herbarium (*GH*) at Harvard, is without flowers or fruit and bears no label at all, but it is plainly the species now called *P. haydenii*. There is writing directly on the herbarium sheet in Gray's hand which says "Laramie Mts, Dr. Hayden, *P. acuminatus*, pl. caul. linear lves." In other words, Gray believed the specimen to have been collected by Hayden in the Laramie Range in Wyoming and suggested that it was a form of *Penstemon acuminatus* with linear cauline leaves. The specimen appears to be post-flowering because it has the ovate floral leaves well developed, but it does not bear fruits. There seems to have been a mix-up about the location of collection. The Engelmann list (p. 201 of Hayden, *op. cit.*) has 12 species of *Penstemon* from a variety of locations. Near the end of the list is the following sequence:

"*Penstemon acuminatus*, Lindl. Sandhills on Loup fork [the North Loup River].

Penstemon Fendleri, Gray. Sandhills on Loup fork.

Penstemon confertus, Lindl. Laramie mountains, August 24th."

It appears likely that the information for the last specimen was mixed with that for one of the two which precede it in the list.

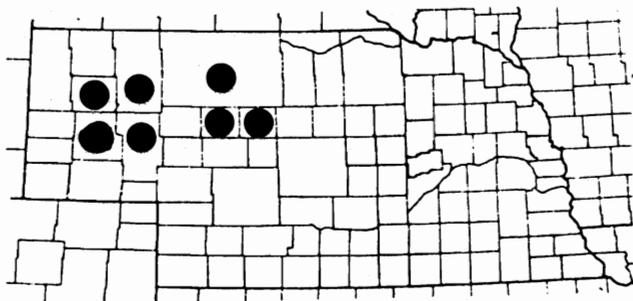


FIGURE 2. Map of Nebraska showing the counties in which *Penstemon haydenii* has been collected.

DESCRIPTION AND TYPE SPECIMEN

The species was first described in 1891 by Sereno Watson, then a Curator of the Gray Herbarium (Brewer, 1902). His description was based on a specimen taken by Herbert J. Webber (then an Assistant of the Shaw School of Botany at Washington University, St. Louis, but earlier an instructor in Botany at the University of Nebraska) on the Dismal River "100 mi w. of the 100th meridian" in Thomas County, Nebraska, on July 12, 1891. Watson had seen the Hayden collection and chose to name the plant *Penstemon haydeni* [*sic*] for its earliest collector. (Article 73 of the "International Code of Botanical Nomenclature" [Voss, 1983] does not allow Watson's correction of the original spelling of the genus "*Penstemon*" to the etymologically more correct "*Penstemon*," but does require that an additional "i" be added to the specific epithet "*haydeni*.") He cited the Hayden specimen, but he based his description on the later Webber material, which demonstrated flowers, fruits, and "rhizomes," all features not visible on Hayden's specimen. This specimen is the logical choice for the type specimen (the specimen with which the name is permanently associated) and was so designated by a later monographer (see below).



FIGURE 3. Portrait of Ferdinand V. Hayden (from White, 1895).

OTHER SPECIMENS AND DUPLICATE COLLECTIONS

One of the foremost students of the Scrophulariaceae, Francis W. Pennell of the Academy of Natural Sciences, Philadelphia, discussed *P. haydenii* on p. 361 of his monograph on Rocky Mountain Scrophulariaceae (1920). At that time he had seen neither the type nor the Hayden specimen, although he had seen an (earlier?) collection by Webber from the type locality and other collections made by Bates, Rydberg, and Krautter. He speculated about the Hayden specimen, suggesting that it might be “not of this species.”

In his “Scrophulariaceae of eastern temperate North America,” pages 267–269, Pennell (1935) cited a few additional specimens, mostly duplicates of ones already seen. In 1930, probably while preparing this monograph, he studied and annotated both Harvard specimens, correctly designating the Webber one as the type and simply annotating the Hayden specimen as “*P. haydenii*,” thereby negating his earlier suggestion that it might not be of this species. He noted in his 1935 article that he and Edgar T. Wherry, of the University of Pennsylvania, had searched for *P. haydenii* in Nebraska in June, 1931, but were “wholly unsuccessful” in their search. He also noted that he had seen a probable duplicate of the Hayden specimen at the Missouri Botanical Garden (*MO*), and that it was labeled as being from “Loup Fork which is actually from the limited area of the species in Nebraska” and not from Wyoming. This note corrected the erroneous notion, based on the specimen at the Gray Herbarium, that the species grew in Wyoming. I asked Jon Ricketson, collections manager at the Missouri Botanical Garden, to check if the Hayden collection still exists there. It does, and there appear to be two sheets of it. The material is very old; one sheet is labeled, only “*Penstemon acuminatus* or a var. of *fendleri*, no flowers” and the other has the same names and an additional, smaller label which says “Sand Hills of Loup Fork.” The specimens are in the same non-flowering condition as the Hayden specimen at the Gray Herbarium and may represent duplicates. My interpretations of them as such rest on Pennell’s suggestion and upon a mention made of one of the specimens in a letter from Webber to G. D. Swezey (see below).

When I visited the New York Botanical Garden Herbarium (*NY*) in 1977, I examined its specimens of *Penstemon haydenii*. It had only four specimens of three collections. One of them, the Webber specimen discussed by Pennell in 1920, bears exactly the same location information as the type specimen at the Gray Herbarium but bears the date “12 Jul 1889.” This is evidently a topotype (a specimen collected at the same location as the type but on a different date), or it may be an isotype (a duplicate of the type) which is mislabeled as to date. (The type specimen bears a label indicating that it was collected on the 12th of July, 1891. It is also possible that the type specimen at the Gray Herbarium [*GH*] bears the wrong date, since there is a similar specimen at

the Missouri Botanical Garden that also bears the date “July, 1889,” and two specimens at the University of Nebraska-Lincoln [*NEB*] are dated July 12, 1889. Pennell annotated the *MO* specimen as a topotype, and it was later annotated anonymously as an isotype, as were the *NEB* specimens.) The oldest collection at *NY* is Bates *s. n.* (“7 June 1887”) from near Valentine, Cherry County, and the most recent collection is *Rydberg 1506* (July 6, 1893, near Plummer Ford on the Dismal River, Thomas County).

In 1977 there were only 14 specimens of six collections at *NEB*, including the Webber collections of 1889. That number has recently been expanded to 26 sheets, largely because of collections added by Ronald Weedon of Chadron State College. Steven Rolfsmeier has recently called my attention to another very old specimen at Doane College, Crete, made by the collector E. E. Sprague at Wellen, Garden County, on June 5, 1890. This specimen has attached to it a letter from H. J. Webber (dated September 19, 1891) to G. D. Swezey, Professor of Natural Sciences at Doane College, explaining that the Sprague specimen represents the same species as Webber’s own Dismal River collections, and that it would soon be described as a new species by Watson. It is interesting that the date of the Sprague collection—1890—falls between the two dates on Webber’s Dismal River collections—1889 and 1891.

The information that I have suggests that eight people had collected *P. haydenii* between the original Hayden Survey collection of unknown date and 1968. Chronologically, they are Bates, Webber, Sprague, Rydberg, Krautter, Dworak, Tolstead, and Welsh. (The Krautter specimen was cited by Pennell [1920] but was not seen by me, so its position in the chronology is uncertain.) Several of these collectors have made important contributions to the study of botany in Nebraska. The Rev. J. M. Bates, of Valentine and Red Cloud, and W. L. Tolstead both made extensive collections in Nebraska. Their specimens make up a significant part of the herbarium holdings at the University of Nebraska–Lincoln. Per Axel Rydberg, then a student at the University of Nebraska and later a curator of the herbarium of the New York Botanical Garden and well-known author of the *Flora of the Prairies and Plains of Central North America* (1932), encountered *Penstemon haydenii* when he was preparing a manuscript on the flora of the Nebraska Sand Hills (1895). Most of these collections were made long ago, except for the collection by S. Welsh of Brigham Young University, made in 1959 (not seen by me, but cited by Lichvar [1982]). All of them were taken in the Sand Hills region of Nebraska. The reports in the literature for Wyoming are based on the incorrect information written on the Hayden specimen at the Gray Herbarium; I do not know the basis for the erroneous report for Kansas on page 187 of volume 3 of the 1913 edition of Britton and Brown’s *Illustrated Flora* (1913), but the species is unknown in the Kansas flora (Freeman, 1986).

In September of 1968, I visited the Sand Hills of Nebraska with Robert Kaul of the University of Nebraska–Lincoln and a graduate student, Dennis Brown. I was new to Nebraska and found all of the Sand Hills flora fascinating. We collected a single specimen (*Sutherland 2103*) of *Penstemon haydenii* from a blowout in Hooker County between Tryon and the Dismal River, near the McPherson County line. We did not take more, probably not from a sense of conservation (we were not aware of what we had collected) but because the material was in fruiting condition and we probably assumed it would be hard to identify. We all commented on the unusual narrowness of the basal leaves and the remarkable “oversize” floral bracts. I recall thinking the plant somewhat grotesque, commenting that I wondered if it could be some sort of aberrant population, perhaps infected with a fungus. I identified it, however, without difficulty in J. M. Winter’s *An Analysis of the Flowering Plants of Nebraska* (1936) and filed it away in the herbarium at the University of Nebraska at Omaha (*OMA*) with the numerous other interesting plants we had obtained that day. It was not until about 1974 when Ronald McGregor, of the University of Kansas Herbarium (*KANU*), supplied me with a preliminary checklist for the Great Plains Flora, from which *Penstemon haydenii* had been omitted, that I realized that we had collected a plant of very limited distribution and specialized habitat.

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